

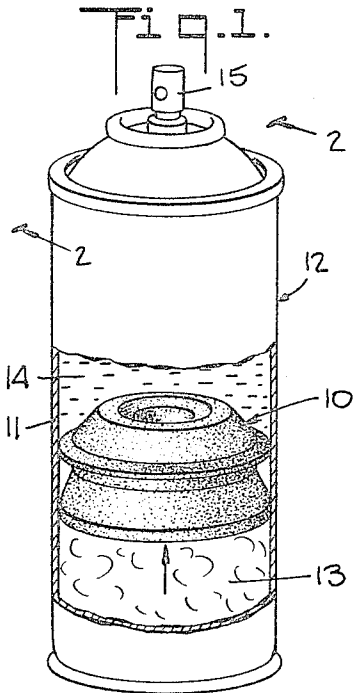
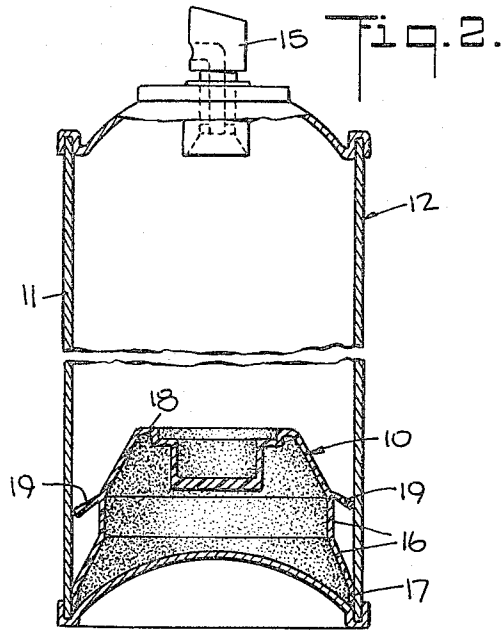
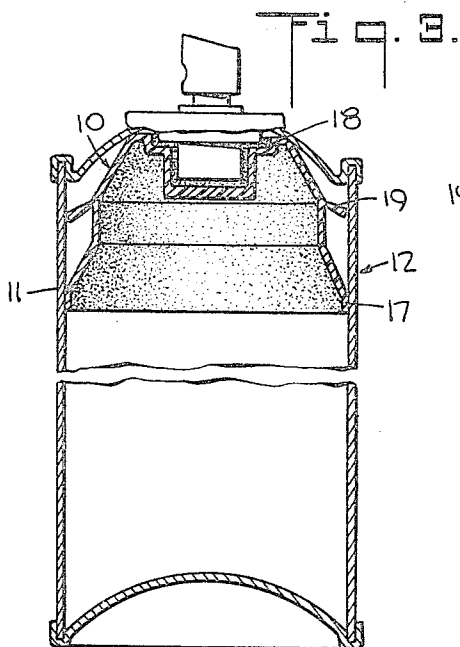
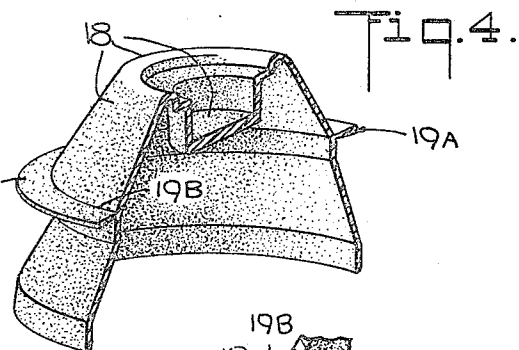
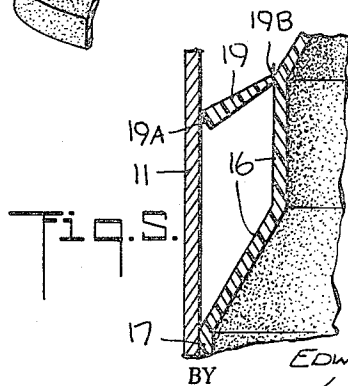
May 7, 1968

E. J. TOWNS
SEPARATING MEDIUM FOR USE IN PRESSURIZED
DISPENSING CONTAINERS

3,381,863

Filed May 23, 1966

3 Sheets-Sheet 1



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Fig. 6.

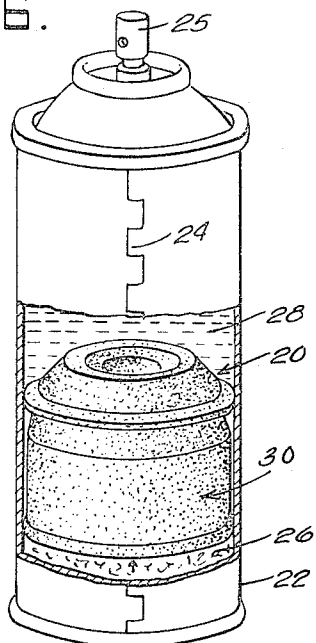


Fig. 7.

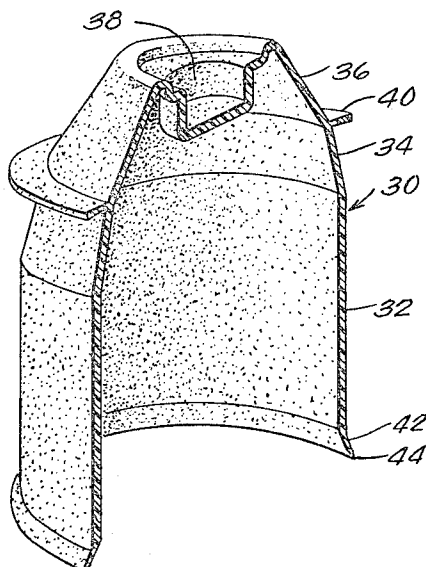


Fig. 8.

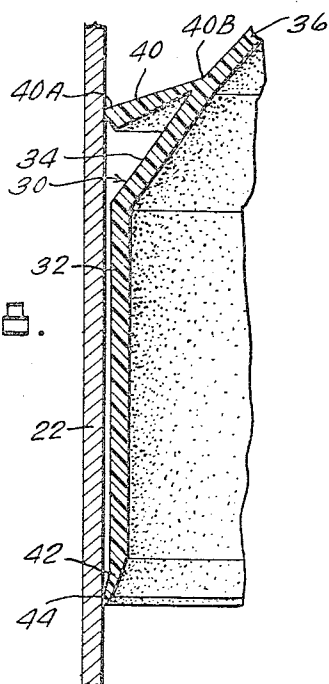
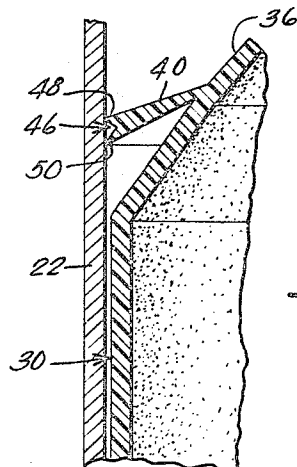


Fig. 9.

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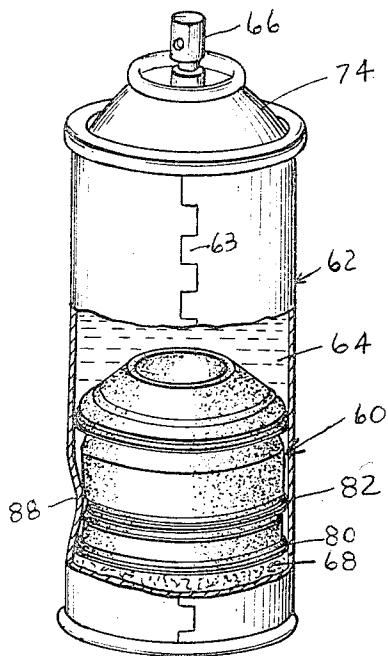


Fig. 10

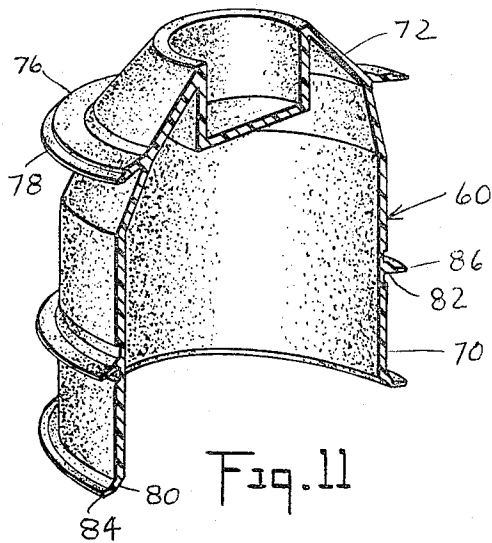


Fig. 11

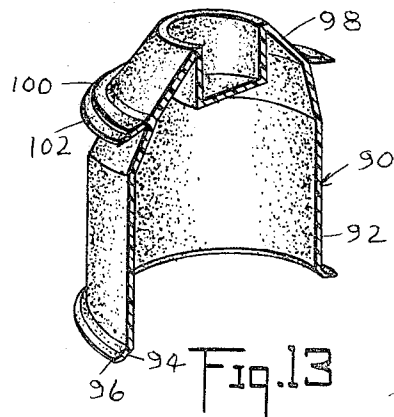


Fig. 13

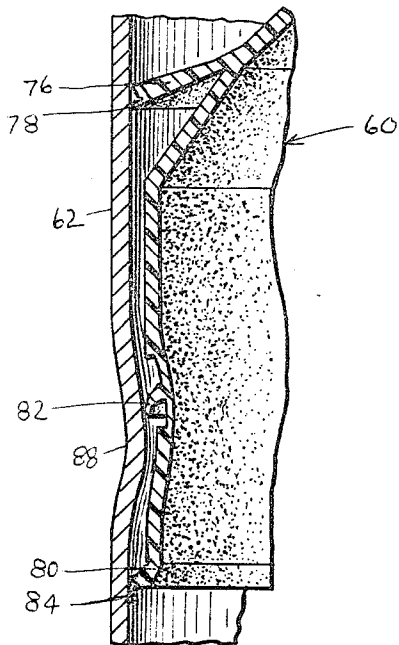


Fig. 12

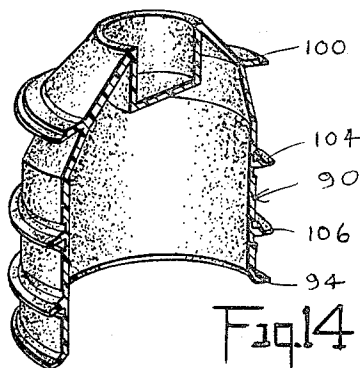


Fig. 14

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SEPARATING MEDIUM FOR USE IN PRESSURIZED DISPENSING CONTAINERS

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Continuation-in-part of application Ser. No. 456,034,
May 4, 1965. This application May 23, 1966, Ser.
No. 560,361

16 Claims. (Cl. 222—386.5)

ABSTRACT OF THE DISCLOSURE

This invention relates to a new and improved separating medium for use in pressurized dispensing containers and more particularly to a new and improved separating medium for use in pressurized dispensing containers in which the propellant is separated from the goods to be dispensed.

This application is a continuation-in-part of co-pending United States application Ser. No. 456,034, filed May 4, 1965 for Separating Medium for Use in Pressurized Dispensing Containers, which in turn is a continuation-in-part of United States application Ser. No. 291,628 filed July 1, 1963 for Piston for Use in Pressurized Dispensing Cans, now abandoned.

This invention relates to a separating medium for use in dispensing containers. Said separating medium comprises a body having a guiding and sealing portion at the lower end of said body, and a flexible resilient annular flange mounted on said body, spaced from said guiding and sealing portion, said flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter.

Pressurized dispensing containers are used for dispensing a wide range of products such as toothpaste, food-stuffs, etc. Two types of dispensing containers are presently in general use: one in which the propellant and the product to be dispensed are intermixed, and the other in which the product to be dispensed is separated from the propellant by some form of separating medium such as a diaphragm, piston or the like. In many applications, the latter type of dispensing container is preferable so that the propellant does not contaminate or otherwise impair the product to be dispensed. Where a pressurized container is used in which the propellant is to be separated from the product to be dispensed, it is desirable that a separating medium be provided which effectively seals the propellant from the product to be dispensed. It is also desirable that the separating medium prevent the product from being ejected before the product to be dispensed has been fully exhausted, and also prevent the goods from being dispensed in mixture with the propellant rather than in their natural viscous state. Furthermore, it is desirable that such a separating medium wipe excess product from the sides of the can as it is forced through the container by the propellant.

Although various types of separating medium have heretofore been used, the usefulness thereof has been found greatly impaired where the inside surface of the container in which the separating medium was used was irregular or deformed due to dents, seams or the like.

According to the present invention, a new and improved separating medium for pressurized dispensing containers is provided which effectively separates the propellant from the goods to be dispensed, and which retains its efficiency in applications where the inner surface of the container is irregularly deformed or is seamed.

It is thus an object of the present invention to provide a new and improved separating medium for use in pressurized dispensing containers which effectively separates the propellant from the goods to be dispensed.

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It is a further object of the present invention to provide a new and improved separating medium for use in pressurized dispensing containers which prevents the propellant from being ejected before the product to be dispensed has been fully exhausted and which also prevents the goods from being dispensed in mixture with the propellant.

It is another object of the present invention to provide a new and improved separating medium for use in pressurized dispensing containers which has improved wiping qualities.

It is yet another object of the present invention to provide a new and improved separating medium for use in pressurized dispensing containers which provides effective wiping and sealing action where the container is dented or otherwise irregularly deformed or where the container is seamed.

It is still another object of the present invention to provide a new and improved separating medium for use in pressurized dispensing containers which is stable and which will not become inoperative or ineffective before all of the product to be dispensed is exhausted.

These and other objects of the present invention are accomplished in general by providing a separating medium having a body preferably made of a flexible, resilient material such as polyethylene or the like. The body of the separating medium preferably has a head of such shape as to conform to the top of the dispensing container. At a point spaced from the base, an annular flange is provided, the flange being of gradually diminishing thickness from its outside portion to the portion where it is connected to the body of the separating medium. The base of the body has a guide portion which is adapted to press against the interior walls of the can and serves to guide the piston on its upward travel in the can so that the piston will not cant or tilt excessively. The annular flange is oversized with respect to the interior diameter of the can so that when the piston is engaged in the can, the annular flange is depressed to form an angle preferably of at least 20° with the general plane of the flange. The edge of the flange engages the wall of the container so as to provide a wiping seal and the variation in thickness of the flange enables the flange to wipe while passing dents in the can without the flange wrinkling.

In one preferred embodiment of the present invention, the body portion of the separating medium is in the general shape of a thin-walled truncated cone. An annular flange, of a shape as described hereinabove, is provided at a point spaced from the base. At the base of the body is provided a guide portion which is generally cylindrical in shape and which has a diameter preferably equal to or greater than the interior diameter of the container.

In another embodiment of the present invention, the body portion of the separating medium has an elongated cylindrical lower portion and an upper portion preferably of shorter length which is in the form of a truncated cone. The length of the cylindrical lower portion is preferably equal to or greater than the diameter thereof. An annular flange, of a shape as described hereinabove, is provided at a point spaced from the lower cylindrical portion of the body. A second annular flange also of a shape as described hereinabove is provided at a point substantially near the end of the lower cylindrical portion of the body. This latter embodiment of the separating medium of the present invention is especially adapted for use in dispensing containers having a seamed inner surface. Thin skirts may be provided along the outer peripheries of flanges to provide better sealing action where the container is dented or the like. Additional intermediate annular flanges may also be provided for better wiping and sealing action.

The above features and objects of the present invention will be evident from the following description and drawings wherein:

FIG. 1 is a perspective view of a separating medium according to one embodiment of this invention in a pressurized dispensing container with portions of the container cut away for clarity;

FIG. 2 is a side sectional elevation of a pressurized dispensing container and the separating medium of FIG. 1;

FIG. 3 shows the pressurized dispensing container of FIG. 2 with the separating medium at its uppermost limit of travel;

FIG. 4 is a perspective view of the separating medium of FIG. 1 with a portion cut away for clarity;

FIG. 5 is an enlarged view of a portion of FIG. 3;

FIG. 6 is a perspective view of a separating medium according to another embodiment of this invention in a pressurized dispensing container having a seamed inner surface with portions of the container cut away for clarity;

FIG. 7 is a perspective view of the separating medium of FIG. 6 with a portion cut away for clarity;

FIG. 8 is a side sectional view of a portion of the separating medium of FIG. 6;

FIG. 9 is a partial side sectional view of a modification of the separating medium of FIG. 6;

FIG. 10 is a perspective view of a separating medium according to another embodiment of this invention in a pressurized dispensing container with portions of the container cut away for clarity;

FIG. 11 is a partially sectional perspective view of the separating medium of FIG. 10;

FIG. 12 is a side sectional view of the pressurized dispensing container and the separating medium of FIG. 10;

FIG. 13 is a partially sectional perspective view of a separating medium according to yet another embodiment of the present invention; and

FIG. 14 is a partially sectional perspective view of a separating medium according to still another embodiment of the present invention.

Referring now to FIG. 1, a separating medium such as piston 10 rides in the cylindrical wall 11 of a pressurized dispensing container such as can 12. Compressed propellant 13 beneath piston 10 tends to force piston 10 upward in can 12, thereby compressing goods 14. Goods 14 may be any material desired to be dispensed in a stream or extruded column such as oil, toothpaste or food spreads, or fluids which for reason of preserving flavor, purity or chemical composition are desired to be effectively isolated from the propellant. By means of dispensing valve 15, goods 14 may be ejected from the dispenser, thus allowing piston 10 to move upward in can 12, thereby maintaining pressure upon the remaining goods 14. Dispensing valve 15 may be of any well-known type which dispenses goods when it is opened. One such valve, for example, is opened by depressing the upper portion thereof.

As shown more particularly in FIG. 2, piston 10 has a body portion in the general shape of a truncated cone having a sidewall portion 16, cylindrical guiding portion 17 and head portion 18. Annular flange 19 is mounted by sidewall portion 16. Head 18 may be of any configuration but is preferably adapted to conform to the top of can 12 and to receive that portion of the dispensing valve 15 projecting inside the can 12 as is best shown in FIG. 3. Head 18, thus constructed, will enable maximum utilization of goods 14. Sidewall portion 16 may take any shape or be substantially eliminated subject to the limitations of stability. Cylindrical guiding portion 17 is preferably of slightly larger diameter than the interior diameter of the can 12. Cylindrical guiding portion 17 furnishes a lower seal as well as lateral support for piston 10 and annular flange 19 furnishes a wiping seal as well as lateral support.

With particular attention to FIGS. 4 and 5, annular flange 19 is mounted by sidewall member 16 and is of

generally diminishing thickness from its portion of greater diameter 19A to its portion of least diameter 19B. "Flange" as used herein shall be taken to mean that part of the annular element disposed beyond its pivot point as, for example, flange 19 is disposed in its entirety beyond the pivot point defined by its point of least thickness 19B. "Annular" flange as used herein shall be taken to mean a flange which defines a plane by the portion thereof connected to the piston body.

Flange 19 is oversized with respect to the interior diameter of can 12; that is to say that the outside diameter of flange 19 as measured on piston 10 prior to insertion in can 12 is greater than the inside diameter of can 12. Flange 19 is preferably made sufficiently oversized with regard to the interior diameter of can 12 so that when piston 10 is engaged in can 12, flange 19 will be depressed from the plane defined by the point of least diameter 19B of the flange. Although flange 19 must form an angle with the general plane of the flange, it is unimportant whether the flange is depressed in the upward or downward direction. Flange 19 is made of a flexible, resilient material so that when flange 19 is made of generally diminishing thickness from its portion of greatest diameter 19A to its portion of least diameter 19B, the flange will be capable of uniform bending without wrinkling when engaged in a can. When a dent in the can wall 11 is encountered by flange 19 on its upward travel in the can, flange 19 will tend to adapt itself to the shape of the dent without wrinkling. Cylindrical guiding portion 17 ensures against excessive tilting or canting of the piston on its upward travel in the can. Some canting may, however, be desirable in order to allow flange 19 to distribute pressure from encountered dents about itself and to allow the piston to more readily traverse such dents or irregularities. The length of cylindrical guiding portion 17 may be varied to permit more or less canting as desired.

For example, if piston 10 is to be used in a can of two inches inside diameter (2.0 in.), the flange 19 may have a diameter of approximately 2.1 inches (measured with the flange in a substantially horizontal plane) and the cylindrical guiding portion 17 may have a diameter of approximately 2.005-2.010 inches. It should be understood that the amount of oversize of the flange 19 is dependent to some extent upon the internal pressure to be used in the can as well as the internal diameter of the can itself and the width of the flange used.

Referring now to FIGS. 6-8, there is shown another embodiment of the separating medium of the present invention, said embodiment being especially adapted for use in seamed dispensing containers. As shown, a separating medium such as piston 20 rides in a dispensing container such as can 22 having a seam 24 and a dispensing valve 25. Piston 20 separates propellant 26 in the lower portion of can 22 from goods 28 in the upper portion of can 22. As indicated hereinabove, goods 28 may be any material desired to be dispensed from can 22. Since it is a compressed state, propellant 26 tends to force piston 20 upwards to compress goods 28. When dispensing valve 25 is opened, a desired amount of compressed goods 28 is ejected from can 22, piston 20 is displaced upwardly until it reaches a state of equilibrium, thus maintaining pressure on goods 28.

As shown more particularly in FIG. 7, piston 20 comprises a body 30, having an elongated, substantially cylindrical lower portion 32 and an upper portion 34 in the general shape of a truncated cone. Piston 20 is also provided with a head 36 which is preferably of such a shape as to conform to the top of can 22, and preferably has a recess 38 to receive the inwardly projecting portion of valve 25 (not shown). Mounted on piston 30 is an annular flange 40 whose outer diameter is preferably larger than the inner diameter of can 22 and whose thickness is greater near its portion of greatest diameter 40A than at its portion of least diameter 40B. The relative thickness of flange 40 is shown more clearly in FIG.

8. As described hereinabove, flange 40 is made of flexible resilient material so that when flange 40 is depressed upon insertion into can 22, it will tend to adapt itself to the shape of any dent, seam or other irregularity in the interior surface of the can in order to maintain effective wiping and sealing action.

It has been found that, although the embodiment of the present invention shown in FIGS. 1-5, provides excellent results in seamless cans, such embodiment is not as efficient in cans having seams.

In order to provide additional sealing action where the dispensing container is seamed, piston 20 is provided with a second annular flange 42, mounted near the lower end of body 30. Flange 42 is of flexible, resilient material, and has a thickness which is greater near its portion of greatest diameter than at its portion of least diameter and is preferably oversized with respect to the inner diameter of can 22. Greater sealing action may be obtained by making flange 42 with a comparatively thin skirt 44.

Referring now to FIG. 9, there is shown a modification of the piston shown in FIG. 8 in which flange 40 is provided with a double skirted outer periphery 46 having a first skirt 48 and a second skirt 50. By providing more than one skirt on flange 40, more effective sealing and wiping action is obtained. It will be understood that although flange 40 is shown having only two skirts in FIG. 9, the scope of the present invention is not limited thereby and that any number of skirts may be provided. It will also be understood that additional skirts may be provided on annular flange 42.

By making the cylindrical body portion 32 of piston 30 elongated, greater stability, from tilting and overturning is provided. The length of said cylindrical body portion is preferably equal to or greater than the diameter thereof.

Referring now to FIGURES 10-12, there is shown a further embodiment of the present invention. As shown, a separating medium such as piston 60 is disposed within a generally cylindrical dispensing container such as can 62. Can 62 is seamed as at 63 and is provided with goods 64 to be dispensed therefrom through valve 66. Compressed propellant 68 beneath piston 60 tends to force piston 60 upward in can 62, thereby compressing goods 64.

As shown more particularly in FIGURE 11, piston 60 has an elongated, generally cylindrical body portion 70 and an upper portion 72 generally in a shape to conform to the upper portion 74 of can 62, in this case in the general shape of a truncated cone. Mounted on piston 60 is an annular flange 76 whose outer diameter is preferably larger than the inner diameter of can 62 and whose thickness is greater near its portion of greatest diameter than near its portion of least diameter. Flange 76 is preferably made of flexible, resilient material so that when piston 60 is inserted into can 62, flange 76 will adapt itself to any dents, seams or other irregularities in the interior surface of can 62 and thereby provide effective wiping thereof and sealing of goods 64 from propellant 68. Flange 76 is provided with a thin skirt 78 to improve the sealing action in cans having interior surface irregularities.

Improved wiping and sealing action is achieved in cans having irregularity formed interior surfaces by providing piston 60 with annular flange 80 mounted near the lower end thereof and annular flange 82 mounted on piston 60 intermediate between flange 76 and flange 80. Flanges 80 and 82 are of flexible resilient material and are preferably molded unitarily with piston 60. As shown, flange 80 which has a thickness which is greater near its portion of greatest diameter than near its portion of least diameter projects from the end of piston 60 and is provided with a thin skirt 84 which projects substantially radially from flange 80. Flange 82 is also provided with a skirt 86 which projects substantially radially therefrom.

Since it is desirable to maintain separation of propellant 68 from goods 64, flanges 80 and 82 increase the wiping efficiency of piston 60 while decreasing the likelihood of commingling of propellant and goods to be dispensed. The provision of thin skirts on flanges 80 and 82 increases this wiping and sealing action when piston 60 is disposed within a container having an irregular interior surface since these thin skirts tend to more easily adopt the configuration of the container's interior surface than the thicker portion of the annular flanges.

This is more clearly shown in FIGURES 10 and 12 where flange 82 is shown adopting the irregular interior surface of can 62 caused by a dent 88 therein. Thus if flange 76 fails to wipe goods 64 from the interior surface of can 60, flanges 82 and 80 will do so, while at the same time preventing propellant from commingling with goods 64.

Referring now to FIGURE 13, there is shown another embodiment of the present invention wherein piston 90 has a substantially cylindrical body portion 92 having an annular flange 94 with a thin skirt 96. Piston 90 is also provided with a head portion 98 having an annular flange 100 with a thin skirt 102. Both flange 94 and flange 100 have a thickness which is greater near the portion of their greater diameter than near the portion of their least diameter. Flanges 94 and 100 are of flexible resilient material and provide wiping and sealing as described hereinabove.

FIGURE 14 shows a modification of the embodiment of FIGURE 13 wherein two intermediate annular flanges 104 and 106 of flexible resilient material provide additional wiping and sealing action.

It will be understood that the separating medium of the present invention as shown and described in the embodiments hereinabove may be conveniently made in one piece by conventional molding techniques well known to those skilled in the art. In most applications, the separating medium will be made of a flexible and resilient material substantially impervious to both propellant and goods although other materials furnishing the desired flexibility and resilience may be used with the addition of an impervious coating.

A separating medium may be constructed according to the present invention utilizing any number of flanges and any number of skirts. It is not intended, therefore, to limit this invention to any specific number of arrangement of flanges or skirts.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred forms has been made only by way of example and that numerous changes in the details of construction and the combinations and arrangements of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A separating medium for use in dispensing containers comprising a body, a guiding and sealing portion at the lower end of said body, and a flexible, resilient annular flange mounted on said body, spaced from said guiding and sealing portion, said flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter, and the outer edge of said annular flange comprising a plurality of individually projecting skirts.

2. A piston for use in pressurized dispensing containers comprising a body in the general shape of a thin-walled, truncated cone; a cylindrical guiding portion mounted by the base of said conically shaped body, the greatest diameter of said guiding portion being at least equal to the inner diameter of said dispensing container, and a flexible, resilient annular flange mounted by said body spaced from said cylindrical guiding portion, said flange being of generally increasing thickness from its

portion of least diameter to its portion of greatest diameter, said flange being oversized with respect to the inner diameter of said container.

3. A piston for use in pressurized dispensing containers comprising a body in the general shape of a thin-walled, truncated cone; a cylindrical guiding portion mounted by the base of said conically shaped body, the greatest diameter of said guiding portion being at least equal to the inner diameter of said dispensing container, and a flexible, resilient annular flange mounted by said body spaced from said cylindrical guiding portion, said flange being of generally increasing thickness from its portion of least diameter to its portion of greatest diameter, said flange being at least twice as thick near its portion of greatest diameter than near its portion of least diameter and said flange being oversized with respect to the inner diameter of said container.

4. In a pressurized dispensing container, a piston comprising a body in the general shape of a thin-walled truncated cone; a cylindrical guiding portion mounted by the base of said conically shaped body, the greatest diameter of said guiding portion being at least equal to the inner diameter of said dispensing container, and a flexible resilient annular flange mounted by said body spaced from said cylindrical guiding portion, said flange being thicker near its portion of greatest diameter than at its portion of least diameter and being oversized with respect to the inner diameter of said container, the outer edge of said flange being uniformly depressed with relation to the plane defined by the portion of least diameter of said flange.

5. In a pressurized dispensing container a piston as in claim 4 wherein said flange is at least twice as thick near its portion of greatest diameter than near its portion of least diameter.

6. In a pressurized dispensing container a piston as in claim 4 wherein the outer edge of said flange is uniformly depressed by at least 20 degrees with relation to the plane defined by the portion of least diameter of said flange.

7. A piston for use in pressurized dispensing containers comprising a body, said body having an elongated cylindrical guiding portion, a first flexible, resilient annular flange mounted on said body spaced from said guiding portion, said first flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter, and a second flexible, resilient annular flange mounted near the base of said guiding portion.

8. A piston for use in pressurized dispensing containers comprising a body, said body having an elongated cylindrical guiding portion, a first flexible resilient annular flange mounted on said body spaced from said guiding portion, said first flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter and being oversized with respect to the inner diameter of said container, and a second flexible resilient annular flange mounted near the base of said guiding portion.

9. The piston of claim 8 wherein said second flange is oversized with respect to the inner diameter of said container.

10. The piston of claim 8 wherein the edge of said first flange comprises a plurality of skirts.

11. A piston for use in pressurized dispensing containers comprising a body, said body having an elongated cylindrical guiding portion forming the base thereof, a first flexible, resilient annular flange mounted on said body spaced from said guiding portion, said first flange having a thickness which gradually decreases from the portion of its greatest diameter to the portion of its least diameter and said first flange being oversized with respect to the inner diameter of said container, and a second flexible, resilient annular flange mounted near the end of said guiding portion, said second flange being oversized with respect to the inner diameter of said container.

12. A separating medium for use in pressurized dispensing containers comprising a body, said body having an elongated cylindrical guiding portion forming the base thereof, a first flexible, resilient annular flange mounted on said body near the upper portion thereof, said first flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter and being oversized with respect to the inner diameter of said container, and a second flexible, resilient annular flange mounted near the lower end of said guiding portion of said body, said second flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter, said first and said second flanges respectively having a thin skirt extending therefrom.

13. A separating medium for use in pressurized dispensing containers comprising a body, said body having an elongated cylindrical guiding portion forming the base thereof, a first flexible, resilient annular flange mounted on said body near the upper portion thereof, said first flange being of greater thickness near its portion of least greatest diameter than near its portion of least diameter and being oversized with respect to the inner diameter of said container, a second flexible, resilient annular flange mounted near the lower end of said guiding portion of said body, said second flange being of greater thickness near its portion of greatest diameter than near its portion of least diameter, and a third flexible, resilient annular flange mounted on said body intermediate said first and said second flanges.

14. The separating medium of claim 13 wherein said flanges are provided with thin skirts.

15. The separating medium of claim 13 wherein the length of said elongated cylindrical guiding portion is substantially equal to or greater than the diameter thereof.

16. The separating medium of claim 13 including a fourth flexible resilient annular flange mounted on said body intermediate said first and said second annular flanges.

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